DOCUMENT RESUME

ED 352 366 TM 018 819

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TITLE Middle School Math Students' Reactions to Heterogeneous Small Group Work: They Like It!
SPONS AGENCY National Science Foundation, Washington, D.C.
PUB DATE Apr 92
CONTRACT MDR-87-51309
NOTE 26p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, April 20-24, 1992).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Classroom Techniques; Cooperative Learning; Grade 7; *Heterogeneous Grouping; High Achievement; Junior High Schools; *Junior High School Students; Longitudinal Studies; Low Achievement; Mathematics Achievement; *Middle Schools; *Peer Relationship; *Small Group Instruction; Student Attitudes; *Student Reaction; Teaching Methods
IDENTIFIERS *Middle School Students

ABSTRACT

Change over time in the cross-achievement level regard of seventh-grade students for teammates in small heterogeneous cooperative learning groups was studied for 184 middle school students (55 percent Hispanic Americans, 27 percent Whites, 14 percent Blacks, and 3 percent Asian Americans) in Los Angeles County (California). Student perceptions about group work and student judgments about how much they had learned through group participation were also studied. This study was conducted in four phases. Students responded to multiple questions at different stages of the study; and each question was examined separately for high, middle, and low achieving students. Students also completed mathematical pretests and posttests to determine the impact of the instructional treatments on students' mathematical problem solving skills. Results indicate that this type of cooperative learning is an instructional methodology that helps break down interpersonal barriers between high, middle, and low achieving students. It may also diminish the possible consequences of being locked into friendship groups where poor attitudes toward school and low aspirations are the norm. The study shows that even high achieving students perceive the benefits of working in heterogeneous groups. These results may allay the fears of those who think that the only role for high achieving students in cooperative learning groups is that of helper. Nine tables present study findings. (SLD)

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Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, April, 1992.

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Middle School Math Students' Reactions to Heterogeneous Small Group Work: They Like It!

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This study first examined change over time in 7th grade middle students' cross-achievement level regard for teammates in small, heterogeneous cooperative learning groups. The study next examined student perceptions about group work, i.e., what students reported to be the best and worst things about working in groups. Finally, the study analyzed the judgements of students, of whether they learn more or less through participation in groups, and why. Each of these questions was examined separately for high, middle and low achieving students.

This study was supported in part by a grant from the National Science Foundation (Grant #MDR 87 51309, Noreen Webb, UCLA, Principal Investigator).

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Theoretical Framework

Cooperative learning, an instructional methodology in which students work together in small, usually heterogeneous groups, on a single task or towards a single goal, often with a group reward, has been shown to increase students' regard for one another generally (Johnson and Johnson,1989; Solomon, 1990; Slavin, 1990; Farivar, 1991), and increase students' regard for classmates who are members of different ethnic or gender groups, or who are disabled (Johnson and Johnson, 1989; Slavin, 1990). The effect for ethnicity holds even when the Hispanic "minority" was the majority (Farivar, 1991). Other studies found regard for disabled students increased with cooperative learning (Johnson and Johnson, 1989; Slavin, 1990). Study of cross-gender regard in cooperative learning groups (Farivar, 1991), found a significant increase in regard for females; regard for males also increased.

In addition to ethnicity, gender, and the presence or absence of a handicapping condition, achievement is another status characteristic that influences interpersonal relations. We can assume that when achievement grouping and tracking divide students socially, as well as academically, students will have higher regard for classmates at the same achievement level, and less regard for students outside their achievement group, and this seems to be the case. St. John and Lewis (1975) found that among a group of Boston elementary schoolchildren, high achievers were more popular than low achievers. Hallinan and Sorensen (1985) found that within-class grouping developed friendship networks that resulted, in part, from their positions in the grouping system. In grouped classes, students were more likely to choose someone in the same achievement group as "best friend;" and, as the year went by, the overlap between ability group membership and friendship networks increased. In both Britain and the United States, secondary school students' friendship networks tended to be centered within their own achievement levels (Hargreaves 1972; Hallinan and Williams 1987).

Heterogeneous grouping of students in cooperative learning groups has been encouraged by educators concerned with the detrimental effects of ability segregation. While there is some disagreement about whether high and low achievers benefit from participating in cooperative groups, the bulk of the evidence indicates that group work does not harm high-ability students academically and that it benefits the achievement of medium and low ability students (Slavin, 1991). However, we know little about the social benefits of cooperative learning for children at different achievement levels. Despite the apparent influence that ability or achievement level has on interpersonal

relations, studies have not examined how this status characteristic may influence social relationships within cooperative learning groups.

As is found with improved ethnic relations, cross-achievement proximity such as students at different achievement levels sitting next to one another or working together in a group, provides an opportunity for positive cross-achievement relationships. But it is not likely, in and of itself, to produce positive relations (Watson, 1947). Teachers often complain about the unsuccessful experiences their students have working in groups, particularly when they are thrown into a group without preparation and told to, for example, prepare a report. Often the most able student does most the work, and/or wants everything done his or her way which further intensifies ability segregation.

To combat these sorts of problems that can emerge in groups and to facilitate heterogeneous (racial, gender, achievement) group work, cooperative learning drew on research on small groups (Bennis and Shepard, 1956; Hare, 1973; Schmuck and Schmuck, 1983; Tuckman, 1965). Schmuck and Schmuck's (1983) "action ideas" (what others might call activities or exercises) to teach students the skills necessary for successful group work were applied to cooperative learning (Baker, Smith, Walters, and Wetzel, 1971; Sharan and Sharan, 1976; Aronson, 1978; Vacha, McDonald, Coburn, Black, 1979; Hoagland, Eyler, and Vacha, 1981; Johnson, Johnson & Holubec,1988; Graves and Graves, 1985; Cohen, 1986; Gibbs, 1987; Solomon, 1990). This preparation for group work, teaching social skills - getting to know one another, learning how to work with others, practicing communication and cooperation skills, is integral to, and many would argue necessary precursors to, many approaches to cooperative learning (Aronson, 1976; Graves and Graves, 1985; Johnson, Johnson & Holubec 1988; Cohen, 1986; Solomon, 1990 and Farivar and Webb, 1991). And although there needs to be further study of the types of activities used, as well as the intensity and duration of preparation for group work within cooperative learning groups, this body of work enables us to assume that the utilization of these activities does, in fact, establish the conditions for positive intergroup contact and sets the stage for interdependent group work.

When students are prepared for group work, working in groups is a powerful instructional methodology for increasing student regard for one another. But students, particularly those who have had more years in school, have had very few experiences working and learning together. In fact, for the most part, students have been discouraged or forbidden to work with classmates. At best, they may have been put in a group or self-selected a group which often leaves the "rejects" all in a group of their

own, assigned a leader and perhaps asked to create a mural or stage a skit. Consequently, they have had little opportunity to learn and practice the basic social skills necessary for group work, such as being able to disagree in an agreeable way or encouraging others to talk, or paraphrasing classmates' responses. More importantly, they have not had the opportunity to learn and practice such sophisticated skills as what to do when you either need help or when you give it. These skills are necessary for cooperative groups to be both socially and educationally beneficial. These skills must be taught and practiced. They cannot be left to happenstance. This kind of preparation for small group work takes time. And since time is a limited commodity, conflicts continuously arise between what we know about the necessity to teach students the skills necessary to be successful in groups and the pressures on teachers regarding content coverage.

Even though students' increase in positive regard for classmates is a good reason, in and of itself, for students to learn in cooperative groups, it is important to try to understand why student regard for group members increases and how regard may relate to learning. Increase in regard may not be a social dimension only; it may also be that students are learning to value one other as an asset to their own learning. It is important, then, to examine such matters as how students at different achievement levels perceive their own learning in heterogeneous cooperative groups as well as their perceptions of the advantages and disadvantages of working in such groups. By working in groups, by having help readily available, by being able to discuss what they are learning, by being more proactive learners, students may perceive themselves as learning more.

This study examines both regard across achievement groups and explores student perceptions related to learning in groups. In this study cooperative learning was what Slavin (1983) would call loosely structured. Yet the preparation for group work was sequenced and structured. Students were prepared for group work in stages: First, they participated classbuilding activities designed to get to know classmates and to feel comfortable in the class. Once the students were comfortable in the class, they were assigned to teams and preparation for group work began. Within the teams, students participated in teambuilding activities to feel comfortable with teammates and then participated in exercises and activities to learn communication and cooperation skills. Finally, students in the treatment group participated in exercises and activities to learn helping skills and effective explaining.

Within the context of extensive preparation for group work, this study addressed questions regarding the role of achievement levels in cooperative learning groups:

Did working in heterogeneous cooperative groups increase students' regard for teammates of different achievement levels? How did students, at different achievement levels, perceive the effect of cooperative learning on their own learning? And finally, by achievement level, what did student perceive as the advantages and disadvantages of working in groups?

Method

Sample

The sample consisted of students enrolled in six general 7th-grade mathematics classes (n=184, 55% Hispanic, 14% Black, 27% White, 3% Asian-American) in one of two middle schools (6th, 7th, 8th grades) in a city in Los Angeles County. These classes did not include seventh grade students with more advanced mathematical skills who were enrolled in a pre-algebra class. Two teachers each taught three classes. Each teacher was assigned two experimental treatment classes and one comparison treatment.

The Hispanic students' English language proficiency varied widely. Some of the Hispanic students spoke no Spanish at all, approximately half of the Hispanic students were not fully English proficient and frequently spoke Spanish both informally and when working on mathematics problems in the small groups.

A mathematical pretest of general math achievement, including word problems and numerical exercises with all the operations, was given to the students at the beginning of the study. The highest one-fourth of the students were then categorized as "high achieving" students, the middle half of the students were categorized as "middle achieving" students, the bottom one-fourth of the students were categorized as "low achieving" students.

Students were teacher-assigned to heterogeneous groups of four students each that reflected the ethnic diversity, mathematical achievement level and gender differences in the classroom (Slavin, 1986). Most groups had one high achieving, one low achieving student and two middle achieving students; two or more Hispanic students, and a balance of males and females. Most groups had four members. Students remained in their assigned groups for the duration of the project.

Instructional Program and Design

The study took place during the spring semester 1988. With one or two exceptions in each class, students participating in the study had been in the same math class, the same period, with the same teacher the previous semester, which began September 1988. Prior to this study the students had no experience learning in

small, heterogeneous, cooperative learning groups - in math class, as in other classes, they sat in rows, worked alone and spent no class time interacting with classmates.

The study was conducted in four phases. In each phase students participated in activities intended to develop their skills in working together. Phase 1 focused on classbuilding and lasted about a week. Beginning with Phase 2, each succeeding phase lasted for about three weeks, with approximately three weeks between phases. Prior to each of Phases 1, 3 and 4 there were several days of teacher training in instruction and practice in cooperative learning that included activities for classbuilding, preparation for group work/teambuilding, communication, cooperation and helping skills and instruction and practice in effective explaining as well as problem-solving instruction.
(A complete listing of the activities and exercises used in this project can be found in Farivar and Webb, 1991).

	Experimental Classes	Comparison Classes
Phase 1	Classbuilding	Classbuilding
Phase 2	Basic Cooperative Learning + Preparation for Group Work Teambuilding	Traditional Instruction
Phase 3	Cooperative Learning + Communication and Cooperation Skills Helping Skills (general, mathematical)	Basic Cooperative Learning + Preparation for Group Work Teambuilding
Phase 4	Cooperative Learning + Communication and Cooperation Skills Helping Skills (general, mathematical) + Instruction, Practice in Effective Explaining	Basic Cooperative Learning + Additional Teambuilding

In every phase, all students and all classes used the same mathematical curriculum, classwork, homework, quizzes, and tests, and followed the same schedule. Much of the material came from a current general mathematics textbook for Grade 7.

To supplement textbook exercises and problems, some lessons were designed around realistic contexts (e.g., designing restaurant menus and ordering and paying for meals, including tip and tax). The difference between experimental and comparison classes lay in whether or not students worked in cooperative groups and degree of training they had for working with others.

Phase 1.

During Phase 1 all classes participated in classbuilding activities designed to build inclusion (Schmuck and Schmuck, 1983, Aronson, 1978; Gibbs, 1987; Graves and Graves, 1985), to familiarize students with each other and to help students be more comfortable in the classroom. As noted above, the students had no previous experience working in small groups. Few students knew one another although they had been in the same class for a semester. Those who did know each other tended to know and be friends with students from their own racial group. Since students would be assigned to heterogeneous groups and expected to work and learn together, the project began with activities that would enable them to know one another - to learn their classmates' names and become accustomed to interacting with a variety of classmates.

Phase 2.

This phase compared basic cooperative learning (whole-class introduction by the teacher combined with cooperative small-group seatwork on problems) with traditional instruction (combination of whole-class instruction and individual seatwork).

Experimental: Students in the cooperative learning condition discussed norms for small group work (being an attentive listener, no "put downs," using moderate voice levels). Students learned and practiced basic helping behaviors and group task and maintenance skills (checking for other students' understanding, sharing ideas and information, encouraging others, and checking for agreement) (Dishon and O'Leary, 1984). The groups decided on a group name, made a group sign and students within the groups assumed specific roles (Johnson and Johnson, 1991) for management purposes (e.g., the "engineer" of a group was responsible for placing the group's papers in their folder at the end of the class period); no roles were used when working on problems. After the teacher's daily introduction the students worked in small groups on the problems.

A partial group reward structure was used to encourage students to help each other learn the material. Although all students in a group turned in their classwork,

each student in a group had a randomly assigned number (1, 2, 3 or 4), and at the end of the lesson the teacher spun a spinner and the number chosen was be the paper that the teacher corrected. All students in the group received that grade for classwork. Homework followed the same format. All students turned in their homework but points earned were based on the randomly chosen number. The group mean on the posttest contributed a portion to each student's grade on the test. Quizzes and other student work were graded individually.

Comparison: Students in the comparison condition had the same teacher introduction to the day's assignment, but worked the problems individually. In most cases, the teacher discouraged students from interacting with each other and required students to ask her for help instead of asking other students. Students were graded individually on all aspects of their work.

Phase 3.

Experimental: The experimental classes received instruction and practice in effective communication and specific helping behaviors prior to beginning the unit. Classes first participated in activities designed to promote group problem solving not related to academic content. The activities were designed to promote listening and to encourage helping others. They also practiced activities designed to show them the benefits of two-way communication and listening to others, and which gave them practice in communicating with others, both verbally and nonverbally (e.g., instruction to assemble a puzzle without looking at the person and without his or her input vs. doing the same task in a natural helping way with two-way communication). Next, the teacher discussed appropriate helping behaviors (e.g., asking for help when you don't understand or think you have the wrong answer, helping someone else if they seem confused, explaining how to solve the problem instead of just giving the answer, not doing the work for another student but giving him or her a chance to do it) (Webb,1985). The teacher explained the reference charts displayed in the classroom ("When you give help..." and "When you don't get it...") (Farivar and Webb, 1991) that summarized important points about giving and getting help. This instructional treatment was designed to help students already working in cooperative groups to communicate more effectively with each other. As before, after a daily introduction by the teacher on the mathematical material, students worked in small groups on the class problems.

Comparison: Comparison classes worked in cooperative groups and participated in the same activities the experimental classes had during Phase 2.

Phase 4

This phase continued the comparison of instructional treatments carried out in Phase 3.

Experimental: At the beginning of the unit, students in the experimental classes participated in activities designed to increase their ability to explain to a classmate how to solve particular mathematical problems. They performed and discussed skits (adapted from Swing and Peterson, 1985) that exemplified effective and ineffective explanations of how to solve mathematical problems.

Comparison: Classes in the comparison condition continued the same basic cooperative learning treatment during Phase 4 as they had during Phase 3. They did not receive instruction or practice in helping behaviors or in explaining how to solve problems.

The Classroom Social Relationships Questionnaire was administered to all students three times: prior to Phase 1, at the end of Phase 1, and at the end of Phase 4. The questionnaire consisted of a listing of all students in each class. Students were asked to mark one of four possible responses for each classmate: "good friend" (the person is a good friend of yours), "OK to be around" (the person is OK to be around), "don't know the person" (you don't know the person), and "pass" (if none of the other three categories fit your relationship with the person).

In addition to the Classroom Social Relationships Questionnaire, at the end of Phase 4 students were also asked three questions: 1.) What are the best things about working in groups at school? 2.) What are the worst things about working in groups at school? 3.) Do you think you learn more or less when you work in groups? Students were asked to circle "more" or "less" and to tell why.

Procedures

Activities and exercises to teach the students different group skills were taught at the beginning of each phase. Other activities, such as reviewing class norms and social skills, were to occur after instruction and prior to beginning group work. In practice, they took place more frequently at the beginning of each phase, particularly in Teacher B's class, and tapered off to about twice a week near the end of each phase. The final five minutes of the class period was supposed to be devoted to a whole-class review of the group's use of group work skills. In reality, this took place about twice a week.

Mathematical pre and post tests were administered during Phases 2, 3, and 4 to determine the impact of the instructional treatments on students' mathematical problem solving skills (see Webb, Qi, Yan, Bushey, Farivar, 1990).

Results

Student Regard for Teammates

Tables 1 through 3 present the results of the low, middle, and high achievement groups' average ratings of their teammates. Means and standard deviations are presented for Time 1, Time 2, and Time 3. Differences over time in student's mean ratings of regard for teammates were tested using multivariate analyses of variance with repeated measures. Greenhouse-Geisser adjustments for degrees of freedom were made when necessary in analysis of the low and high achievement groups due to the unequal variance produced by the smaller sample size in these two groups. Due to the large amount of missing data, results for each achievement group were analyzed using separate MANOVAS.

Low Achievement Level

Results for the overall MANOVA with Repeated Measures indicate a significant change over time for low achievement level students' regard for their middle achievement level teammates, $F(2.74) = 9.78$ $p<.001$ (see Table 1). Simple contrasts for the analysis show this difference in mean regard occurring between Time 1 and Time 3, $F(1,37) = 16.57$ $p<.001$. While the change in regard from Time 2 to Time 3 approached significance $F(1,37) = 3.76$ $p<.06$), these means are not statistically different. As expected, low students' regard for other low students did not change over time. Similarly, regard for high students was not statistically different. Further, as illustrated by Table 1, low achieving students' regard for fellow low achieving students was consistently lower than their regard for middle or high achieving students.

Middle Achievement Level

As shown in Table 2, MANOVA results for the middle achievement students indicated that there was a significant increase over time in their regard for both the low achieving students, $F(2.80) = 7.94$ $p<.001$ and high achieving teammates, ($F(2.94) = 8.75$ $p<.001$). For the low achievers, these differences occur between Time 1 and Time 3, $F(1,40) = 15.98$ $p<.001$, while for the high group, the differences were significant for both Time 1 to Time 3, $F(1,47) = 14.71$, $p<.001$, and time 2 v. Time 3, $F(1.47) = 4.49$, $p<.05$. Consistent with expectation, the middle students' regard for fellow middle students was not different over time.

High Achievement Level

Table 3 shows changes in the high achievement students' mean ratings for their low, middle and high teammates. Results from the MANOVA show that regard significantly increase over time for both the low achieving teammates, $F(1.68, 53.73) = 7.43$ $p<.001$ (with Greenhouse-Geisser adjustment), and the middle achieving students, $F(1.58,79.2) = 34.75$, $p<.001$ (with Greenhouse-Geisser adjustment). With respect to the low achieving students, regard increased from Time 1 to Time 3, $F(1,50) = 1\text{-}.05$, $p<.003$. Similar to other achievement groups' results, high achievement level students did not change over time.

Comparison by Teacher and Condition, Effect of Teacher

The potential possible effects of using different teachers were examined in a series of 2 (teacher) X 3 (time) MANOVA with repeated measures, separately for each of the low, middle and high groups. A significant main effect for teachers was found only for high achieving students' change over time for middle achieving teammates $F(1.6, 78.72) = 3.16$, $p<.05$ (see Table 4).

Student Perceptions About Group Work

Student responses to a series of questions about group work were divided into categories that emerged from a content analysis of the data. Student responses are reported by percent.

What are the best things about working in groups?

Student answers to the question what they liked best about working in groups fell into four categories: Cooperation/Help, Increased Productivity, Social Relationships and No Response. Answers such as "I can ask questions", "we help each other", "if you need help they can help you", "If you're stuck on some problem you can ask your partners," and "get better help because kids know more about what we understand than the teacher" were recorded as Cooperation/Help.

Student responses such as "get work done faster", "you understand more, learn more, have a chance to talk it over to see if you got the right answer and if you didn't you can correct it", "easier to correct answers," and "learn better" were recorded as Increased Productivity.

Responses such as "become friends with people you don't know", "get to talk to friends", "learn to be friends, how to cooperate and get along during school", and "meet new people" were recorded as Social Relationships.

Responses with more than one answer, such as "have fun, get help, and you can also develop better relationships with people," were placed in the category of response first mentioned.

Table 5 presents the findings of factors students liked best about working in groups. Cooperation/Help was the factor chosen most frequently by students in all three achievement groups. 60% of the low achievement students chose this category, 50% of the high, and 45% of the middle achievers. Social Relations was the category chosen second. 21% of the middle, 12% of the high and 9% of the low achieving students liked the social aspects of working in groups best.

What are the worst things about working in groups?

Student answers to the question what were the worst things about working groups fell into five categories: Negative Social Relationships, Grade Interdependence, Lack of Group Skills, Nothing Wrong, and No Response. Responses relating to the the social aspect of group work such as "I'm not with my friends", "you're with people you don't like", "people are in a bad mood", "she thinks she's everything", "they get mad at you", and "they bother me" were recorded as Negative Social Relationships.

The Grade Interdependence category included responses such as "you get group grades when someone doesn't do anything", "others don't do the work and you get marked down for it and your partners don't care", "someone doesn't do things right and you have to pay for it", and "it lowers your grade if someone else has a bad grade".

Lack of Group Skills included a range of responses that demonstrate frustration about not being productive, such as "not getting as much work done", "not doing the work", "not knowing how to do the work", as well as responses that show concern about not using cooperative and helping skills while working on the tasks - "fighting over work", "not cooperating", "people not trying", and "one person does all the work".

Some students responded that there was "nothing wrong" or "practically nothing" bad about being in groups. Their responses went into the category "Nothing Wrong". When there was no answer the response was put into the category No Response.

Table 6 presents the findings for the worst things about working in groups. The largest percentage of students in any achievement group, 43% of the high achievers, found Lack of Group Skills the worst thing about working in groups. This choice was second for both the middle and low achieving students. The second largest block of students, 27%, was again the high achievers for whom Grade Interdependence was their second choice of worst things about working in groups.

Low and middle achieving students' responses were more evenly divided across the factors students rated worst about working in groups. 23% of the low

achieving students reported that Grade Interdependence was the worst thing about working in groups. Their second choice, Lack of Group Skills, followed closely with 21%, and 16% chose Negative Social Relations and Nothing. 23% of the middle achievers reported that Negative Social Relationships were the worst, and Grade Interdependence and Lack of Group Skills were each chosen by 19% of these students.

16% of both low and middle achieving students and 5% of the high achievers chose Nothing as being worst about working in groups.

Do you think you learn more or less when you work in groups and why?

Responses to this question were first tallied and recorded into four categories: more, less, the same, no response.

Table 7 presents the findings of responses to student perceptions about whether they learned more or less working in groups. 70% of the low and middle achieving students responded that they learned more working in groups, 61% of the high achievers did also. Conversely, more of the high achievers (27%) felt they learned less in groups compared with 10% of the middle and 9% of the low achievers.

Why do you learn more working in groups?

The Learn More working in groups responses were analyzed and four categories emerged: ones that specifically mentioned help, such as "you get help", "group members help you", "other people can help you". These were put into the category Help.

Responses that mentioned understanding, such as "they know how to do it and will help you understand," were recorded Understand.

When explaining was mentioned, "the people explain to each other," the category Explain was used, and the category Teach was used for such responses as "if they know something and you don't they may tell you or show you how to do it".

Some responses that did not fit these categories were recorded as Other and include responses such as "work together", "share ideas", "it's easier".

Table 8 presents the findings of student perceptions about why students learn more in groups. A little more than half of the students who reported that they learned more working in groups in each of the achievement groups (59% low, 55% middle, 54% high) attributed their increased learning to their having access to Help. The other categories, Understand, Explanations, Teach/Learn, which could be considered components of getting and giving help, were each chosen by between 8% and 17% of the different achievement groups.

The Learning Less working in groups responses were analyzed and three categories emerged: Talk/Off Task, Grades, and Don't Help. Responses such as, "I can't concentrate", and "don't get along" were categorized as Talk/Off Task. Responses such as "get low grades" were categorized as Grades. The category Don't Help included such responses as "some don't help" and "if I have a question I can't ask my teammates because they don't know what's going on".

Table 9 reports the findings of student perceptions as to why students learn less working in groups. Very few students (23) responded to this question. Of these, Talking/Being Off Task was chosen the most frequently. 60% of the low achieving students, 45% of the high achievers and 29% of the middle achievers chose this category as the reason they learned less working in groups. 29% of the middle achieving and 13% of the high achieving chose Grades as the reason they learned less in groups, and 29% of the middle and 9% of the high achievers attributed Don't Help to the reason they learned less in groups.

Discussion

As was found with increased cross-ethnic and cross-gender regard (Farivar, 1991), the sequence of interventions used in this project was successful in increasing cross-achievement group regard. This study also found that high, middle and low achieving students experience group work quite differently. These differences occurred despite the fact that this study took place in "regular" math classes, ones from which students with the highest level of mathematical skill had been removed.

The low achievers increased their regard for their middle achieving teammates but not for fellow lows or for high achievers. It should be noted that there were only a small number of cases when two low students were in the same group. This does not, however, explain their lack of increase in regard for high students. Further research needs to be done with larger numbers of students to tease out more precisely what is happening with low students social relationships in cooperative learning groups.

Some educators have expressed concern that in heterogeneous groups high achievers would overpower and have difficulty working with low and middle achieving students. This was not the case. Both high and middle achievers increased their regard for low students; the low achievers were not ostracized in the groups. Change over time in the highs' regard for lows and middles and the middles for lows and highs was significant.

Both lows and highs had the highest regard for middle achievers. At Time 3 the low's regard for the middles was 3.42, and the high's regard for the middles was 3.33. Informal observations of small group work have led some teachers to comment that

middle achieving students seem to provide a kind of "glue" in groups, helping to bridge the gap between higher and lower achievers. In this study of change in regard over time, this observation seems to be the case. But further study should be undertaken, particularly related to group composition.

In this study, middle and high achieving students increased their regard for low achieving students, although the increase was less than the increase highs had for middles and the middle had for highs. These findings are consistent with the literature. Traditionally, low achievers have been less popular (St. John and Lewis,1975). This approach, while not altering the ranking, did seem to increase regard towards lows, even though not as high.

The main effect for teacher in the high achievers' increased regard for middle achieving teammates is consistent with similar findings of differences between the teachers in other analyses of different aspects of this study (Webb et al 1990, Farivar, 1991). Of the two teachers, Teacher B's classes were consistently more structured than Teacher A's and had been for the semester prior to the beginning of the study when the students were in class together but not working in groups. Teacher A was comfortable with the students, the atmosphere in the classroom was amicable and friendly. She bantered with the students about sports and school activities as they were settling down to work. Students in the classes seemed comfortable with each other.

Teacher B's classes, on the other hand, were consistently more structured than Teacher A's. She was thorough in everything she did. She was not uncomfortable with the students but certainly not as comfortable as Teacher A. There was little student interaction in the classes. Teacher B had difficulty with one or two particular students and sometimes sent them to the office.

These differences in classroom context may help explain the difference in increased regard of the high achieving students for middle achieving students in Teacher B's classes. Prior to the study, there had been no formal or even informal attention given to getting to know one another as a class. Teacher A's classes were much more conducive to student interaction prior to the study. Formalizing classbuilding through activities during Phase 1 may have been an enhancement of what was already taking place rather than being something entirely new.

The findings on student perceptions may help us speculate about what underlies the increase in regard across achievement groups. The students' answers regarding the best and worst things about working in groups were insightful, reflective and focused on learning. Students at all ability levels (lows 60%, middles 45%, highs

50%) overwhelmingly found Cooperation and Help as things they liked best about working in groups. Next, students at all ability levels liked the Social Aspects of group work (lows 9%, middles 21%, highs 12%) next best. The third factor mentioned was Productivity, getting the job done (lows 7%, middles 21%, highs 12%). One Hispanic, female, low achieving student summed it up quite succinctly, "someone will always help you and you have a wonderful time."

The worst things about working in groups for nearly half of the students (low 47%, middle 42%, highs 57%) pertained to negative interpersonal relationships and included the categories Negative Social Relationships and Lack of Group Skills. One high achieving, African-American male said, "when you need help really bad and they just ignore you." An Anglo high achieving male said, "when we argue.", "Some kids act stupid" by a Hispanic, middle achieving male and, "people can be mean to you and tease you about something," by an Anglo, middle achieving male were typical responses. Students are very perceptive and knowledgeable about what prevents groups from working smoothly. The findings for change in regard indicate that while the preparation for group work did, in fact, increase students' regard for one another, more work still needs to be done. Teachers cannot assume that students have the social skills necessary to work in groups. Social skills cannot be ignored. They need to be taught on an ongoing basis.

27% of the high, 23% of the low, and 19% of the middle achieving students reported Grade Interdependence as the worst thing about working in groups. These responses came as some surprise. In classroom observations there had been little, if any, discussion of Grade Interdependence among students, leading to the assumption that it was not important. But the responses showed it to be important: one low achieving Hispanic female said, "if someone doesn't do their work and gets a C that is the group grade;" an Anglo middle achieving female wrote that she didn't like "group grades when others don't do anything and that is part of our grade." An Anglo, high achieving female wrote, "others don't do their work and you get marked down for it and your partners don't care."

The issue of rewards in cooperative learning groups is a thorny one. Recent debate has centered on whether or not group rewards are necessary and whether or not rewards are, in fact, detrimental to students' long term learning (Slavin, 1991; Kohn, 1991a,b; Schaps and Lewis, 1991; Graves, 1991). This study indicates it to be an important issue and one that needs further research in a variety of classroom situations. The positive aspects of group work are very powerful, they may overcome some of the negative effects of group grades. However, students dislike of grade

interdependence may help explain why regard for lows remained lower than regard for middles and highs.

In this study students were taught helping skills and were actively encouraged to help one another. When students were asked whether they learned more or less working in groups the overwhelming response was more. 70% of the low and middle achievement students and 61% of the high achievers felt they learned more working in groups. Students mentioned help or access to help as the primary reason they learned more working in groups. This was true across all achievement levels - (lows 59%, middles 55%, highs 54%). Interestingly, the other answers from students about why they learn more in groups dealt with such sub-sets of help as understanding, explanations, teaching and learning. Students were quite articulate about their perceptions in these areas. For example, an Anglo male high achiever wrote, "they help you when you have trouble with a problem". An African American female middle achiever noted that, "you can get help when the teacher can't help you", and a low achieving Hispanic male student concluded, "you learn more working in groups because there are nerds sitting next to you and they could explain the work really well and you get the hang of it in a second". These responses contrast with traditional classrooms in which access to help when needed is a serious problem. Typically students raise their hands and wait for the teacher to come help them. By the time the teacher responds, the question may have been forgotten. Worse yet, students are sometimes reprimanded for not working when they wait for the teacher even when if they continue on while they need help they are only compounding the problem for they continue to work the problems incorrectly. Perhaps student regard was influenced by these factors, even though they were sometime aggravated by tensions within the group.

23 (12%) of the students in the study commented on why they learned less working in groups. Five of the 46 high achieving students addressed the need to help group mates. An Anglo high achieving male said, "everyone in the group bugs me so much I can't do anything." Another Anglo male wrote, "in my group if I have a question I can't ask my teammates because they don't know what's going on." And there were other reasons: one high achieving Hispanic female said, "it's better working by yourself because some people don't do their work", and an Anglo female said, "you talk about subjects that have nothing to do with math." An Anglo male noted, "I already know most things so I stayed about the same."

Only two of the low achievers who said they learned less working in groups noted why: "I can't concentrate with my group," noted a Hispanic female, and, "if we

work in groups we only keep talking," also by a Hispanic female. Among the seven middle achievers who said they learned less working in groups there were a variety of responses, as reflected in the following by a white female: "you talk, don't pay attention, argue, and if your partners are stupid or don't do their work or are enemies (I'm not saying mine are), you don't get your work done."

In conclusion, this study is important in several ways. First, peer groups exert enormous influence on attitudes toward school and career aspirations, particularly at the middle school level. If cooperative learning is, as this study indicates, an instructional methodology that helps break down interpersonal barriers between high, middle and low achieving students, it may also diminish the possible consequences of students' being locked into friendship groups where poor attitudes toward school and low aspirations are the norm. Second, there is a concern in the literature that cooperative learning may be an instructional methodology with negative consequences for high achieving students. This study should help dispel the concerns of many educators in showing that even high achieving students perceive benefits from working in heterogeneous groups, as shown in the following comments from two of them: "if you don't know, kids can explain," and, "if you don't know something you can ask your group to teach you." Such responses may allay the fears of those who are concerned that the only role high achievers play in cooperative learning groups is that of helper.

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Table 1

Multivariate Analysis of Variance with Repeated Measures
Low Achieving Students' Average Ratings
of Low, Middle, and High Achieving Teammates

	N		Time1	Time 2	Time 3	p<
low	13	$\bar{x}$	2.31	2.31	2.23	NS
		sd	.63	.86	.93	
middle	38	$\bar{x}$	2.61	3.05	3.42	.001*
		sd	1.13	1.01	.98	
high	21	$\bar{x}$	2.67	3.10	3.14	NS
		sd	.86	.89	1.06	

Table 2

Multivariate Analysis of Variance with Repeated Measures
Middle Achieving Students' Average Ratings
of Low, Middle, and High Achieving Teammates

	N		Time1	Time 2	Time 3	p<
low	41	$\bar{x}$	2.59	3.05	3.22	.001*
		sd	1.02	.97	.99	
middle	68	$\bar{x}$	2.81	2.97	3.07	NS
		sd	.95	1.13	1.16	
high	48	$\bar{x}$	2.65	2.94	3.92	.001*
		sd	1.06	1.14	.99	

* denotes significance at p<.05

Table 3

Multivariate Analysis of Variance with Repeated Measures
High Achieving Students' Average Ratings
of Low, Middle, and High Achieving Teammates

	N		Time1	Time 2	Time 3	p<
low	33	$\bar{x}$	2.73	2.76	3.06	.01*
		sd	1.1	.90	1.09	
middle	51	$\bar{x}$	2.22	3.02	3.33	.001*
		sd	1.05	.86	.84	
high	21	$\bar{x}$	2.92	3.31	3.31	NS
		sd	1.12	.75	.63	

Table 4

Main Effect for Teacher
High Achieving Students' Average Regard for
Middle Achieving Teammates

	N		Time 1	Time 2	Time 3	
Teacher A	22	$\bar{x}$	2.36	2.96	3.09	
		sd	1.00	1.1	.97	
Teacher B	29	$\bar{x}$	2.10	3.07	3.51	
		sd	1.08	.75	.69	
						p <.05*

* denotes significance at p<.05

Table 5

Factors Students Liked Best
About Working in Groups
by Achievement Level

	N	Cooperation and Help	Productivity	Social Relations	No Response
Low	43	60%	7%	9%	23%
Middle	86	45%	13%	21%	21%
High	44	50%	10%	12%	28%

Table 6

Factors Students Liked Least
About Working in Groups
by Achievement Level

	N	Negative Social Relationships	Grade Interdepend.	Lack of Group Skills	Nothing	No Response
Low	43	16%	23%	21%	16%	23%
Middle	86	23%	19%	19%	16%	23%
High	44	14%	27%	43%	5%	11%

Table 7

Student Perceptions About Whether
Students Learn More or Less Working in Groups
by Achievement Level

	N	More	Less	Same	No Response
Low	43	70%	9%	2%	19%
Middle	86	70%	10%	2%	17%
High	44	61%	27%	0%	11%

Table 8

Student Perceptions About Why
Students Learn More Working in Groups
by Achievement Level

	N	Help	Understand	Explanations	Teach/Learn	No Response
Low	27	59%	11%	11%	11%	7%
Middle	51	55%	12%	4%	14%	15%
High	24	54%	8%	13%	17%	8%

Table 9

Student Perceptions About Why
Students Learn Less Working in Groups
by Achievement Level

	N	Talk/Off Task	Grades	Don't Help	Other
Low	5	60%	0%	0%	40%
Middle	7	29%	29%	29%	14%
High	11	45%	13%	9%	35%